

REMARKS

In the Office Action, claims 1-5 and 11-15 stand rejected under 35 U.S.C. § 103(a) as allegedly being obvious over U.S. Patent No. 6,348,736 (McGahay) in view of U.S. Patent No. 5,610,105 (Vines). Claims 7-10 and 17-22 stand rejected under 35 U.S.C. § 103 as allegedly being obvious over McGahay in view of Vines and U.S. Patent Publication No. 2002/0090822 (Jiang). Applicants respectfully traverse the Examiner's rejections.

The invention, as set forth in independent claims 1 and 11 includes, among other things, the general features of forming a low-k dielectric layer over a substrate, heat treating the substrate to promote out-gassing of volatile materials for a predetermined period of time after forming the low-k dielectric layer, and converting an upper portion of the low-k dielectric layer into a protective dielectric to form a sacrificial cap layer after heat treating the substrate.

As admitted by the Office Action McGahay fails to teach or suggest heat treating the substrate for a predetermined period of time to promote out-gassing prior to forming the sacrificial cap layer. The Office Action relies on Vines as teaching this feature.

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 U.S.P.Q.2d 1438 (Fed. Cir. 1991); M.P.E.P. § 2142. Moreover, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490

F.2d 981, 180 U.S.P.Q. 580 (CCPA 1974). If an independent claim is nonobvious under 35 U.S.C. § 103, then any claim depending therefrom is nonobvious. *In re Fine*, 837 F.2d 1071, 5 U.S.P.Q.2d 1596 (Fed. Cir. 1988); M.P.E.P. § 2143.03.

With respect to alleged obviousness, there must be something in the prior art as a whole to suggest the desirability, and thus the obviousness, of making the combination. *Panduit Corp. v. Dennison Mfg. Co.*, 810 F.2d 1561 (Fed. Cir. 1986). In fact, the absence of a suggestion to combine is dispositive in an obviousness determination. *Gambro Lundia AB v. Baxter Healthcare Corp.*, 110 F.3d 1573 (Fed. Cir. 1997). The mere fact that the prior art can be combined or modified does not make the resultant combination obvious unless the prior art also suggests the desirability of the combination. *In re Mills*, 916 F.2d 680, 16 U.S.P.Q.2d 1430 (Fed. Cir. 1990); M.P.E.P. § 2143.01. The consistent criterion for determining obviousness is whether the prior art would have suggested to one of ordinary skill in the art that the process should be carried out and would have a reasonable likelihood of success, viewed in the light of the prior art. Both the suggestion and the expectation of success must be founded in the prior art, not in the Applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 U.S.P.Q.2d 1438 (Fed. Cir. 1991); *In re O'Farrell*, 853 F.2d 894 (Fed. Cir. 1988); M.P.E.P. § 2142.

A recent Federal Circuit case makes it crystal clear that, in an obviousness situation, the prior art must disclose each and every element of the claimed invention, and that any motivation to combine or modify the prior art must be based upon a suggestion in the prior art. *In re Lee*, 61 U.S.P.Q.2d 143 (Fed. Cir. 2002). Conclusory statements regarding common knowledge and common sense are insufficient to support a finding of obviousness. *Id.* at 1434-35. "Our case law makes clear that the best defense against the subtle but powerful attraction of hindsight-based obviousness analysis is rigorous application of the requirement for a showing of the

teaching or motivation to combine prior art references.” *Teleflex v. KSR Intern. Co.*, 119 Fed. Appx. 282 (Fed. Cir. 2005) (unpublished) (citations omitted). In making an obviousness rejection, it is necessary for the Examiner to identify the reason why a person of ordinary skill in the art would have combined the prior art references in the manner set forth in the claims.

It is respectfully submitted that any attempt to assert that the invention defined by independent claims 1 and 11 is obvious in view of the prior art of record constitutes an impermissible use of hindsight using Applicants’ disclosure as a roadmap.

Vines is directed to heat treatment to promote outgassing in a deposited silicon dioxide layer. In contradistinction thereto, Applicants teach heat treating a low-k dielectric layer prior to forming a cap layer. Applicants have determined that nitrogen and nitrogen compounds may diffuse through the low-k dielectric material and poison the subsequently formed resist layer. Neither McGahay nor Vines contemplate this problem associated with low-k dielectric layers or teach a solution to it.

The heat treatment taught by Vines relates to a completely different process situation and a completely different process chemistry. There is absolutely no motivation in McGahay to provide a heat treatment step, as McGahay completely fails to comprehend the poisoning problem. That motivation can also not be found in Vines, as Vines is not at all related to low-k materials. Moreover, the motivation cannot be found generally in the prior art, as there is no suggestion that nitrogen diffusion through a low-k dielectric layer can cause poisoning. The only motivation for providing a heat treatment step is contained in Applicant’s disclosure, which both recognizes the poisoning problem and performs a heat treatment to mitigate the effects thereof. For this reason, the only motivation for combining McGahay and Vines results from improper hindsight.

Furthermore, the combination of McGahay and Vines fails to teach all the features of the claimed subject matter. Vines teaches heat treating a silicon dioxide layer. Applicants do not employ a silicon dioxide layer that requires heat treatment. There is no reasonable expectation of success when McGahay and Vines are combined, because neither suggests heat treating the low-k dielectric layer prior to forming a cap layer.

There can be no motivation to combine McGahay and Vines to solve a problem that neither comprehends, and there can be no reasonable expectation of success when neither reference suggests when or on what later to perform such a heat treatment.

For these reasons, the combination of McGahay and Vines fails to teach or suggest the claimed subject matter. Accordingly, claims 1, 11, and all claims depending therefrom are allowable. Applicants respectfully request the rejection of these claims be withdrawn.

Jiang fails to correct the defects identified above with respect to McGahay and Vines. Specifically, Jiang also teaches a cap layer formation step without a preceding heat treatment out-gassing step. Accordingly, the combination of McGahay, Vines, and Jiang also fails to teach or suggest the features of the claimed subject matter.

For at least the aforementioned reasons, it is respectfully submitted that all pending claims are in condition for immediate allowance. The Examiner is invited to contact the undersigned attorney at (713) 934-4070 with any questions, comments or suggestions relating to the referenced patent application.

Respectfully submitted,

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